Remarks

Currently pending in the application are claims 30 and 45-48.

35 U.S.C. § 112

The Examiner rejected claim 47 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In support of claim 47's limitation "wherein the nano-clay is a natural or modified bentonite, saponite, hectorite, montmorillonite or synthetic mica fluoride", Applicants direct the Examiner's attention to claim 7 in the priority document (published as WO 2005/016993). Accordingly, Applicants request the rejection be withdrawn.

35 U.S.C. § 103

The Examiner rejected claims 30 and 45-48 under 35 U.S.C. § 103(a) as being unpatentable over Marten et al. (US 2002/0040098) in view of Eichorst et al. (US 2001/0019813). Applicants traverse this rejection for the following reasons.

According to method claims 30 and 45-48 of the present application, a non-isocyanate based polyurethane product is produced by (i) mixing one or more cyclocarbonate resins with at least one nano-clay having a platelet thickness of less than 25 Å and an aspect ratio higher than 10 or a nanocomposite formed from the nano-clay, and with at least one hardener to form a composition; and (ii) curing the composition.

In comparison, Marten et al. teach a method of (i) mixing a cyclocarbonate resin with a polyamine; (ii) curing the mixture to form a product; and (iii) then adding an additive (F) (such as those described in column 15, lines 45-53) to the fully cured product. In particular, "[t]he incorporation of additives (F) into the fully reacted [product] comprising components (A) to (E) is generally carried out using forcing mixers

. . . ." *US Pat. No. 5,847,027* at col. 15, ll.54-56. Thus, Applicants method is clearly distinguished from the method taught in Marten et al. since the nano-clay (or nanocomposite) in Applicants method is incorporated prior to crosslinking allowing the cured polymeric material to exhibit enhanced physicochemical and mechanical properties. *See US 2007/0135588* at [0051].

Adding Eichorst et al. to Marten et al. does not bring one skilled in the art closer to Applicants claimed method. Eichorst et al. has been added for teaching the addition of specific platelets of clay particles into a sulfonated isocyanate-based polyurethane binder. Thus, Marten et al. combined with Eichorst et al. does not lead one to a method of forming a non-isocyanate based polyurethane by mixing a cyclocarbonate resin with a nano-clay (or a nanocomposite formed from the nano-clay) and with a hardener to form a composition and then curing the composition to form the non-isocyanate based polyurethane as presently claimed.

As noted above, Applicants have surprisingly found its inventive method produces non-isocyanate based polyurethanes which exhibit enhanced physical and mechanical properties as compared to non-isocyanate polyurethanes produced conventionally. For example, Applicants respectfully direct the Examiner's attention to Example 36 and Figure 3 in the present application where the moisture permeability of a non-isocyanate based polyurethane produced from Applicants inventive method was compared against one produced conventionally. Inventive NPU (prepared by mixing a cyclocarbonate resin with a nanoclay then curing the mixture with a hardener) exhibited a water uptake of 20.56% after 60 days. In comparison, RPU (prepared by curing a cyclocarbonate resin with a hardener) exhibited a water uptake of 25.9% after 60 days.

Thus, the moisture permeability of the non-isocyanate polyurethane produced using the presently claimed method was improved by 20%. As stated in the present application, "it is believed that the introduction of nanoclays into the polymeric network results in the formation of an internal barrier hindering the penetration of the water molecules into the matrix and decreas[ing] the capability of the polar atoms/groups . . . present in the matrix to attract water molecules via the formation of hydrogen bonds." *US 2007/0135588* at [0127].

The surprising results are neither taught, fairly suggested nor predicted in the publications cited above nor were they expected by the Applicants. Accordingly, Applicants submit that claims 30 and 45-48 are not obvious in view of the publications cited above and respectfully request the rejections under 35 U.S.C. § 103(a) be withdrawn.

Conclusion

Applicants respectfully submit that the application is now in condition for allowance, and respectfully request an issuance of a Notice of Allowance directed towards the pending claims.

Should any fee be due in connection with the filing of this document, the Commissioner for Patents is hereby authorized to deduct said fee from Huntsman Corporation Deposit Account No. 08-3442.

Respectfully Submitted,

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